

### **REMARKS**

Claims 1, 2, 4, 5, 14-21, 25, 32, 33, 34, 37, 52, 53, 59 and 60 are pending in this application. Claims 1, 2, 4, 5, 14-21, 25 and 32 are withdrawn by the examiner as being drawn to a non-elected subject matter. Claims 33, 34, 37, 52, 53, 59 and 60 are under examination. The Office Action is discussed below:

#### ***Information Disclosure Statement:***

Applicants herewith submit legible copies of the documents listed on IDS filed on February 27, 2006. Reconsideration of the listed documents is requested.

#### ***Drawing Objection:***

Replacement sheets of Figures 1A and 1B are submitted herewith that show sufficient details as described in the specification paragraph [0120]. Applicants further clarify that Figure 1 shows an optimal microscopy image (Figure 1A) and a fluorescence microscopy image (Figure 1B) of polyester textile treated with a non-fluorescent linker polymer (OptoDex) or the dye-labeled (fluorescent) Cy3-OptoDex. The polyester textile treated with the non-fluorescent linker polymer OptoDex is therefore not be visible in Figure 1B.

Replacement sheets of black and white copies of Figures 2-4 with higher resolution and contrast also are submitted herewith.

#### ***Anticipation Rejection:***

On pages 3-4 of the Office Action, the examiner has rejected claims 33, 34 and 59 under 35 U.S.C. 102(b) allegedly as being anticipated by Sigrist *et al.* (*J Photochem Photobiol, B: Biol.*, 7:277-287, 1990, "the Sigrist reference"). According to the examiner, the Sigrist reference teaches the covalent photo-linking of a hetero-bifunctional crosslinker to glass fiber, thus anticipates the claimed invention. Applicants

respectfully disagree and refer the examiner to the dictates of the MPEP that:

During patent examination, the pending claims must be "given their broadest reasonable interpretation consistent with the specification." The Federal Circuit's *en banc* decision in *Phillips v. AWH Corp.*, 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005) expressly recognized that the USPTO employs the "broadest reasonable interpretation" standard:

The Patent and Trademark Office ("PTO") determines the scope of claims in patent applications not solely on the basis of the claim language, but upon giving claims their broadest reasonable construction "in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364[, 70 USPQ2d 1827] (Fed. Cir. 2004). Indeed, the rules of the PTO require that application claims must "conform to the invention as set forth in the remainder of the specification and the terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description." 37 CFR 1.75(d)(1).

See MPEP § 2111 at 2100-31 (Rev. 6, September 2007).

In this case, applicants mention that Hans Sigrist is also a co-inventor of this application, and clarify that the "yarn or textile product" as recited in the claims does not refer to the glass microfibers used in the Sigrist reference. A textile product, as defined in the present invention, includes a cloth or fabric, particularly any woven material, while a yarn product includes any spun thread (see page 11, first paragraph, for example). The invention concerns not simply textiles or yarns, but products made from these substances for example by weaving or spinning. The introduction of the present application makes it clear that the invention aims to address prior art shortcomings associated with known natural or synthetic yarn or textile products, which are typically subjected to extreme production or treatment processes such as chemical treatment during spinning and/or post-spinning, dyeing and associated curing, post-spinning texturation and/or cleaning (see pages 1-3, for example). The claimed invention relates to yarn or textile products that are amenable to chemical and/or biochemical functionalization due to the presence of a non-linker molecule with a desired property. The non-linker molecule is attached to the product via a linker molecule by means of a

covalent link resulting from carbene intermediate reactions.

In contrast, as noted on page 278 in the Materials section, the Sigrist reference employs Whatman GF/C glass filter paper to provide a solid support for coupling of the heterobifunctional photocross-linker 3-(trifluoromethyl)-3-(*m*-isothiocyanophenyl) diazirine (TRIMID). Whatman glass filter papers are made from 100% borosilicate glass (see attached product information sheet obtainable from Whatman website). The applicant submits that one of ordinary skill in the art would not reasonably interpret the glass filter papers as used in the Sigrist reference to fall within the scope of a yarn or textile product of the instant claims. Rather, the Sigrist reference is concerned the investigating carbene reactivity of different amino acids using TRIMID, and uses glass filter papers simply as a solid support for this investigation (see paragraph 3 on page 278). Claimed invention relates to “yarn or textile products”, as clarified above, and the Sigrist reference does not concern yarn or textile products. Therefore, the Sigrist reference does not anticipate the invention according to claims 33, 34 and 59.

On page 4 of the Office Action, the examiner also has rejected claims 33, 34, 37, 52, 53, 59 and 60 under 35 U.S.C. 102(b) allegedly as being anticipated by Mooradian *et al.* (“Mooradian”, U. S. Patent No. 5,853,744). The examiner believes that Mooradian discloses covalently binding linking molecules to a fibrous substrate and photo-activating the linking molecule to generate carbene functional groups to further attach to a bio-molecule, which includes enzymes and growth hormones (refers to Mooradian, C2:L35-C3:L60 | C7:L34-C8:L18). The examiner also believes Mooradian discloses the requisite components of the invention in detail and with sufficient specificity to warrant anticipation. Again, applicants respectfully disagree with the examiner, refer to above clarification regarding the claimed invention, and point out that Mooradian does not disclose “yarn or textile products”, as defined in the instant specification (see page 11, first paragraph, for example).

The Mooradian disclosure relates to glasses and fibers and not to the claimed “yarn or textile products” (see column 8, line 7 of Mooradian, for example). More specifically, Mooradian disclosure is specifically relevant to medical devices (see col. 3,

lines 1-3 of Mooradian). Mooradian disclosure also relates methods of making a medical device having a molecule immobilized on a substrate surface. This method involves immobilizing a bio-molecule (such as a synthetic peptide) covalently onto a support surface, attaching a photoreactive cross-linking agent to the immobilized bio-molecule to form a photoreactive analog of the biomolecule, removing the photoreactive analog and then attaching this analog to a substrate surface such as a biomaterial that forms part of a medical device (see column 2, line 35 to column 3, line 60 of Mooradian). In the passage at column 8, lines 4-18, examples of support surfaces used for immobilizing the bio-molecule are provided, including membranes, particles, spherical beads, fibers, gels, glasses and functionalized polystyrene. To one of ordinary skill in the art, there is no disclosure in Mooradian of a yarn or textile product, as defined according to the present invention, as a support surface for immobilizing a bio-molecule. The support surface example of “fibers” in Mooradian would be understood to relate to fibers such as those present in filter papers similar to those used in the Sigrist reference. Therefore, Mooradian does not anticipate claim 33 or any claim dependent thereon.

Regarding claims 52 and 53, the examiner has referred to a part of Mooradian (at column 5, lines 10-59) that deals with solid-phase peptide synthesis (SPPS) for chemical production of a synthetic peptide (typically, low molecular weight peptides). Thus, for example, the term “smoothly cleavable protecting group” at column 5, lines 27-28 relates to the removal of a protecting group during chemical (non-enzymatic) peptide synthesis. This is different from the instant invention recited in claim 52 where the linker molecule of the invention (which by dependency on claim 33 is linked covalently to the non-linker molecule and to the yarn or textile product following carbene intermediate reactions that are not present during SPPS) comprises a cleavage site to allow release of the non-linker molecule or functional group from the yarn or textile product under predetermined conditions. According to the present invention, such a cleavage site may for example be a target for a hydrolytic enzyme to allow enzyme-induced or biosystem-induced release of the non-linker molecule (see claim 53, for example), which does not occur in Mooradian’s purely chemical SPPS process.

Example 5 of the present application shows dextranase catalyzed release of OptoDex-tethered lysozyme, which again illustrates the difference between the instant claims and the SPSS process recited by the examiner.

In view of the above clarifications, applicants submit that the Sigrist reference and Mooradian does not disclose the claimed invention. Accordingly, withdrawal of the anticipation rejection is solicited.

***Obviousness Rejection:***

On pages 5-6 of the Office Action, the examiner has rejected claims 37, 52, 53 and 60 under 35 U.S.C. 103(a) allegedly as being unpatentable over Sigrist *et al.* (the Sigrist reference) in view of Mooradian *et al.* ("Mooradian", US 5,853,744). Applicants disagree with the examiner, refer to above clarification that neither the Sigrist reference nor Mooradian disclose a yarn or textile product, accordingly, a combination does not results in the claimed invention. In order to assist the examiner in further distinguishing the claimed invention from the Sigrist reference and the Mooradian, applicants submit that:

The Sigrist reference concerns the photo-induced binding of amino acids to glass fibers in glass filter papers, using the hetero-bifunctional crosslinker TRIMID. The Sigrist reference states: "The carbene precursor 3-(trifluoromethyl)- 3-(*m*-isothiocyanophenyl)diazirine (TRIMID) is covalently bound by thiocarbamoylation to a glass fibre support" (see page 278, final paragraph of Introduction). The Sigrist reference does not teach or suggest yarn or textile products, as noted above, and nor does the Sigrist reference teach or suggest yarn or textile products with attached bio-molecules such as enzymes. Furthermore, the cross-linker TRIMID is not *per se* cleavable, and the Sigrist reference provides no indication that release of immobilized product may be effected by hydrolytic enzyme action on the linker molecule.

Mooradian does not help with the deficiencies in the Sigrist reference. Mooradian teaches covalent binding of a hetero-bi-functional photoreactive cross-linker

agent to a peptide (for example, a synthetic peptide formed by SPPS) and attaching the so-formed photoactivatable peptide derivative to a substrate such as a biomaterial surface of a medical device (see column 4, lines 26-33). Mooradian demonstrates this with the use of a nitrene-generating hetero-bi-functional cross-linker, using polystyrene (PS) or poly(ethylene terephthalate) (PET) as substrates (see columns 9-11 of Mooradian). Thus, Mooradian does not teach nor suggest a yarn or textile product.

Furthermore, the methods described in Mooradian are not feasible with carbene precursors required for making the product of the instant invention. As noted above, the “smoothly cleavage sites” referred to by the examiner concern chemical (non-enzymatic) peptide synthesis by SPPS, and not sites on a linker molecule which allow release of a non-linker molecule or functional group from the yarn or textile product. Mooradian does not teach predetermined conditions which correlate with enzyme-induced or bio-system-induced release of a non-linker molecule according to the present invention.

From the Sigrist reference, one of ordinary skill in the art thus learns that photogenerated carbenes covalently bind to individual amino acids, with different reactivities. From Mooradian, one of ordinary skill learns that nitrene-generating low molecular weight synthetic peptide analogues can be immobilized on material substrates. From this combined knowledge, it would not have been obvious to one of ordinary skill that bioengineered yarn or textile products can be generated, with these products optionally being equipped with tethered biologically active macromolecules that are in certain embodiments cleavable under predetermined conditions (such as in the presence of hydrolytic enzymes). Therefore, the examiner has not established a *prima facie* case of obviousness.

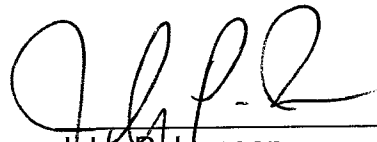
Nevertheless, neither the Sigrist reference nor the Mooradian disclosure teach a yarn or textile product, and for the reasons noted above, even if the Sigrist reference and the Mooradian disclosure are combined (which the examiner has provided no rationale to undertake), the teachings of the Sigrist reference and the Mooradian disclosure do not allow one of ordinary skill to arrive at the present invention, because,

Mooradian disclosure does not rectify the deficiencies of the Sigrist reference and *vice versa*. Thus, a combination of the Sigrist reference and the Mooradian disclosure does not make the claimed invention obvious. Therefore, withdrawal of the obviousness rejection is requested.

**REQUEST**

Applicants submit that claims 33, 34, 37, 52, 53, 59 and 60 are in condition for allowance, and respectfully request favorable consideration to that effect. The examiner is invited to contact the undersigned at (202) 416-6800 should there be any questions.

Respectfully submitted,

  
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May 29, 2008  
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